

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for bypassing a network change by a node in a communication network, the node having a forwarding table, the method comprising:

pre-determining a recovery path for bypassing a network change that affects communications over a primary path;
installing the recovery path in the forwarding table along with the primary path;
detecting the network change that affects communications over the primary path;
and

switching communications from the primary path to the recovery path in order to bypass the network change.

Claim 2 (original): The method of claim 1, wherein pre-determining the recovery path for bypassing the network change comprises:

establishing as the recovery path a label switched path that bypasses the network change.

Claim 3 (original): The method of claim 1, wherein pre-determining the recovery path for bypassing the network change comprises:

logically introducing the network change into a routing database; and
determining the recovery path based upon a pre-determined path determination scheme.

Claim 4 (original): The method of claim 3, wherein the pre-determined path determination scheme comprises a shortest-path-first computation.

Claim 5 (canceled).

Claim 6 (original): The method of claim 1, wherein detecting the network change that affects communications over the primary path comprises:
using a fast liveness protocol to detect the network change.

Claim 7 (original): The method of claim 1, wherein the network change comprises a link failure.

Claim 8 (original): The method of claim 1, wherein the network change comprises a node failure.

Claim 9 (original): The method of claim 1, wherein the network change comprises a routing change.

Claim 10 (original): The method of claim 1, wherein switching communications from the primary path to the recovery path in order to bypass the network change comprises:
activating the recovery path.

Claim 11 (original): The method of claim 10, wherein activating the recovery path comprises:
removing the primary path from a forwarding table.

Claim 12 (original): The method of claim 10, wherein activating the recovery path comprises:
blocking the primary path in a forwarding table.

Claim 13 (original): The method of claim 10, wherein activating the recovery path comprises:
marking the recovery path as a higher priority path than the primary path in a forwarding table.

Claim 14 (original): The method of claim 1, wherein switching communications from the primary path to the recovery path in order to bypass the network change comprises:
forwarding all communications from the primary path over the recovery path.

Claim 15 (original): The method of claim 1, wherein switching communications from the primary path to the recovery path in order to bypass the network change comprises:
forwarding some communications from the primary path over the recovery path based upon a predetermined priority scheme.

Claim 16 (original): The method of claim 15, wherein the predetermined priority scheme comprises an IP Differentiated Services scheme.

Claim 17 (original): The method of claim 1, further comprising:
determining a new primary path.

Claim 18 (original): The method of claim 17, wherein determining the new primary path comprises:
receiving routing information; and
computing the new primary path based upon the routing information.

Claim 19 (original): The method of claim 17, further comprising:
activating the new primary path.

Claim 20 (original): The method of claim 19, further comprising:
switching communications from the recovery path to the new primary path after activating the new primary path.

Claim 21 (original): The method of claim 19, wherein determining the new primary path and activating the new primary path comprise:

freezing a forwarding table after switching communications from the primary path to the recovery path;

computing the new primary path while the forwarding table is frozen; and

coordinating activation of the new primary path with at least one other node in the communication network.

Claim 22 (original): The method of claim 21, wherein coordinating activation of the new primary path with at least one other node in the communication network comprises:
using a timer to determine when to activate the new primary path.

Claim 23 (original): The method of claim 21, wherein coordinating activation of the new primary path with at least one other node in the communication network comprises:
using a predetermined diffusion mechanism to determine when to activate the new primary path.

Claim 24 (original): The method of claim 21, wherein coordinating activation of the new primary path with at least one other node in the communication network comprises:
receiving a signal from a master node; and
activating the new primary path upon receiving the signal from the master node.

Claim 25 (original): The method of claim 21, wherein coordinating activation of the new primary path with at least one other node in the communication network comprises:
receiving signals from a number of slave nodes;
determining that the number of slave nodes have completed computing new primary paths; and
activating the new primary path upon determining that the number of slave node have completed computing new primary paths.

Claim 26 (original): The method of claim 25, further comprising:
sending a signal to the number of slave nodes.

Claim 27 (original): The method of claim 17, further comprising:
computing a new recovery path to protect the new primary path.

Claim 28 (original): The method of claim 19, further comprising:
computing a new recovery path after activating the new primary path.

Claim 29 (currently amended): A device for bypassing a network change in a communication network, the device comprising:

a forwarding table;

recovery path logic operably coupled to pre-determine a recovery path for bypassing a network change that affects communications over a primary path and installing the recovery path in the forwarding table along with the primary path;

detection logic operably coupled to detect the network change that affects communications over the primary path; and

switching logic operably coupled to switch communications from the primary path to the recovery path in order to bypass the network change.

Claim 30 (original): The device of claim 29, wherein the recovery path logic is operably coupled to establish as the recovery path a label switched path that bypasses the network change.

Claim 31 (original): The device of claim 29, wherein the recovery path logic is operably coupled to logically introduce the network change into a routing database and determine the recovery path based upon a pre-determined path determination scheme.

Claim 32 (original): The device of claim 31, wherein the pre-determined path determination scheme comprises a shortest-path-first computation.

Claim 33 (canceled).

Claim 34 (original): The device of claim 29, wherein the detection logic is operably coupled to use a fast liveness protocol to detect the network change.

Claim 35 (original): The device of claim 29, wherein the network change comprises a link failure.

Claim 36 (original): The device of claim 29, wherein the network change comprises a node failure.

Claim 37 (original): The device of claim 29, wherein the network change comprises a routing change.

Claim 38 (original): The device of claim 29, wherein the switching logic is operably coupled to activate the recovery path in order to switch communications from the primary path to the recovery path.

Claim 39 (original): The device of claim 38, wherein the switching logic is operably coupled to remove the primary path from a forwarding table in order to activate the recovery path.

Claim 40 (original): The device of claim 38, wherein the switching logic is operably coupled to block the primary path in a forwarding table in order to activate the recovery path.

Claim 41 (original): The device of claim 38, wherein the switching logic is operably coupled to mark the recovery path as a higher priority path than the primary path in a forwarding table in order to activate the recovery path.

Claim 42 (original): The device of claim 29, wherein the switching logic is operably coupled to forward all communications from the primary path over the recovery path.

Claim 43 (original): The device of claim 29, wherein the switching logic is operably coupled to forward some communications from the primary path over the recovery path based upon a predetermined priority scheme.

Claim 44 (original): The device of claim 43, wherein the predetermined priority scheme comprises an IP Differentiated Services scheme.

Claim 45 (original): The device of claim 29, further comprising:
reconvergence logic operably coupled to determine a new primary path.

Claim 46 (original): The device of claim 45, wherein the reconvergence logic is operably coupled to receive routing information and compute the new primary path based upon the routing information.

Claim 47 (original): The device of claim 45, wherein the reconvergence logic is operably coupled to activate the new primary path.

Claim 48 (original): The device of claim 47, wherein the switching logic is operably coupled to switch communications from the recovery path to the new primary path upon activation of the new primary path.

Claim 49 (original): The device of claim 47, wherein the reconvergence logic is operably coupled to freeze a forwarding table during computation of the new primary path and coordinate activation of the new primary path with at least one other node in the communication network.

Claim 50 (original): The device of claim 49, wherein the reconvergence logic is operably coupled to use a timer to determine when to activate the new primary path.

Claim 51 (original): The device of claim 49, wherein the reconvergence logic is operably coupled to use a predetermined diffusion mechanism to determine when to activate the new primary path.

Claim 52 (original): The device of claim 49, wherein the reconvergence logic is operably coupled to receive a signal from a master node and activate the new primary path upon receiving the signal from the master node.

Claim 53 (original): The device of claim 49, wherein the reconvergence logic is operably coupled to activate the new primary path upon determining that a number of slave nodes have completed computing new primary paths based upon signals received from the number of slave nodes.

Claim 54 (original): The device of claim 53, wherein the reconvergence logic is operably coupled to send a signal to the number of slave nodes upon determining that the number of slave nodes have completed computing new primary paths.

Claim 55 (original): The device of claim 45, wherein the recovery logic is operably coupled to compute a new recovery path to protect the new primary path.

Claim 56 (original): The device of claim 47, wherein the recovery logic is operably coupled to compute a new recovery path after activation of the new primary path.

Claim 57 (currently amended): A computer program for programming a computer system to bypass a network change in a communication network, the computer program comprising:

recovery path logic programmed to pre-determine a recovery path for bypassing a network change that affects communications over a primary path and to install the recovery path in a forwarding table along with the primary path;

detection logic programmed to detect the network change that affects communications over the primary path; and

switching logic programmed to switch communications from the primary path to the recovery path in order to bypass the network change.

Claim 58 (original): The computer program of claim 57, wherein the recovery path logic is programmed to establish as the recovery path a label switched path that bypasses the network change.

Claim 59 (original): The computer program of claim 57, wherein the recovery path logic is programmed to logically introduce the network change into a routing database and determine the recovery path based upon a pre-determined path determination scheme.

Claim 60 (original): The computer program of claim 59, wherein the pre-determined path determination scheme comprises a shortest-path-first computation.

Claim 61 (canceled).

Claim 62 (original): The computer program of claim 57, wherein the detection logic is programmed to use a fast liveness protocol to detect the network change.

Claim 63 (original): The computer program of claim 57, wherein the network change comprises a link failure.

Claim 64 (original): The computer program of claim 57, wherein the network change comprises a node failure.

Claim 65 (original): The computer program of claim 57, wherein the network change comprises a routing change.

Claim 66 (original): The computer program of claim 57, wherein the switching logic is programmed to activate the recovery path in order to switch communications from the primary path to the recovery path.

Claim 67 (original): The computer program of claim 66, wherein the switching logic is programmed to remove the primary path from a forwarding table in order to activate the recovery path.

Claim 68 (original): The computer program of claim 66, wherein the switching logic is programmed to block the primary path in a forwarding table in order to activate the recovery path.

Claim 69 (original): The computer program of claim 66, wherein the switching logic is programmed to mark the recovery path as a higher priority path than the primary path in a forwarding table in order to activate the recovery path.

Claim 70 (original): The computer program of claim 57, wherein the switching logic is programmed to forward all communications from the primary path over the recovery path.

Claim 71 (original): The computer program of claim 57, wherein the switching logic is programmed to forward some communications from the primary path over the recovery path based upon a predetermined priority scheme.

Claim 72 (original): The computer program of claim 71, wherein the predetermined priority scheme comprises an IP Differentiated Services scheme.

Claim 73 (original): The computer program of claim 57, further comprising:
reconvergence logic programmed to determine a new primary path.

Claim 74 (original): The computer program of claim 73, wherein the reconvergence logic is programmed to receive routing information and compute the new primary path based upon the routing information.

Claim 75 (original): The computer program of claim 73, wherein the reconvergence logic is programmed to activate the new primary path.

Claim 76 (original): The computer program of claim 75, wherein the switching logic is programmed to switch communications from the recovery path to the new primary path upon activation of the new primary path.

Claim 77 (original): The computer program of claim 75, wherein the reconvergence logic is programmed to freeze a forwarding table during computation of the new primary path and coordinate activation of the new primary path with at least one other node in the communication network.

Claim 78 (original): The computer program of claim 77, wherein the reconvergence logic is programmed to use a timer to determine when to activate the new primary path.

Claim 79 (original): The computer program of claim 77, wherein the reconvergence logic is programmed to use a predetermined diffusion mechanism to determine when to activate the new primary path.

Claim 80 (original): The computer program of claim 77, wherein the reconvergence logic is programmed to receive a signal from a master node and activate the new primary path upon receiving the signal from the master node.

Claim 81 (original): The computer program of claim 77, wherein the reconvergence logic is programmed to activate the new primary path upon determining that a number of slave nodes have completed computing new primary paths based upon signals received from the number of slave nodes.

Claim 82 (original): The computer program of claim 81, wherein the reconvergence logic is programmed to send a signal to the number of slave nodes upon determining that the number of slave nodes have completed computing new primary paths.

Claim 83 (original): The computer program of claim 73, wherein the recovery logic is programmed to compute a new recovery path to protect the new primary path.

Claim 84 (original): The computer program of claim 75, wherein the recovery logic is programmed to compute a new recovery path after activation of the new primary path.

Claim 85 (original): The computer program of claim 57 embodied in a computer readable medium.

Claim 86 (original): The computer program of claim 57 embodied in a data signal.

Claim 87 (currently amended): A communication system comprising a plurality of interconnected communication nodes, wherein primary paths are established for forwarding information, and wherein recovery paths for bypassing network changes that affect communication over the primary paths are pre-computed for bypassing potential primary path failures and installed in a forwarding table along with the primary paths.

Claim 88 (original): The communication system of claim 87, wherein communications are switched from a primary path to a recovery path in order to bypass a network change.

Claim 89 (original): The communication system of claim 88, wherein new primary paths are determined after communications are switched from the primary path to the recovery path, and communications are switched from the recovery path to a new primary path.

Claim 90 (original): The communication system of claim 89, wherein each communication node freezes a forwarding table before determining new primary paths.

Claim 91 (original): The communication system of claim 89, wherein new recovery paths for protecting the new primary paths are computed before switching communications from the recovery path to the new primary path.

Claim 92 (original): The communication system of claim 89, wherein new recovery paths for protecting the new primary paths are computer after switching communications from the recovery path to the new primary path.

Claim 93 (original): A method for reconverging routes in a communication network, the method comprising:

- determining that a route change is needed;
- freezing forwarding tables so that a predetermined set of routes is used during reconvergence; and
- reconverging on a new set of routes while the forwarding tables are frozen.

Claim 94 (original): The method of claim 93, further comprising:
activating the new set of routes in a coordinated manner.

Claim 95 (original): The method of claim 94, wherein activating the new set of routes in a coordinated manner comprises:

- starting a timer by each of a number of nodes in the communication network upon determining that reconvergence is needed; and
- activating the new set of routes by each of the number of nodes upon expiration of the timer.

Claim 96 (original): The method of claim 94, wherein activating the new set of routes in a coordinated manner comprises:

- using a predetermined diffusion mechanism by each of the number of nodes to determine when reconvergence is complete; and
- activating the new set of routes by each of the number of nodes upon determining that reconvergence is complete.

Claim 97 (original): The method of claim 94, wherein activating the new set of routes in a coordinated manner comprises:

designating one of the number of nodes as a master node and designating the remaining nodes as slave nodes;

sending a first signal by each of the slave nodes to the master node upon reconverging on the new set of routes; and

sending a second signal by the master node to the slave nodes upon receiving the first signal from each of the slave nodes.

Claim 98 (currently amended): A use of a bypass mechanism for bypassing a network change in a communication network, the use comprising:

using the bypass mechanism to pre-compute a recovery path for bypassing a network change affecting communication over a primary path, install the recovery path in a forwarding table along with the primary path, detect the network change affecting communication over the primary path, and switch communications from the primary path to the pre-computed recovery path upon detecting said network change.

Claim 99 (original): The use of claim 98, further comprising:

using the bypass mechanism to compute a new primary path after switching communications from the primary path to the pre-computed recovery path; and

using the bypass mechanism to switch communications from the pre-computed recovery path to the new primary path.

Claim 100 (original): The use of claim 99, further comprising:

using the bypass mechanism to compute a new recovery path for bypassing a network change affecting communication over the new primary path.